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**STUDIES ON MAYFLY *TELOGANOPSIS GRACILIS* (TSHERNOVA, 1952)
(EPHEMEROPTERA: EPHEMERELLIDAE)**

E. A. Gorovaya

Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far East Branch of the Russian Academy of Sciences, Vladivostok, 690022, Russia. E-mail: brouny@mail.ru

Summary. Full morphological description, photos and drawings of a middle age larva of *Teloganopsis gracilis* are presented. Among all the species of the genus *Teloganopsis*, the larva of *T. gracilis* is most similar to the type species *T. media* from Indo-Malayan region. The larvae of both species have tubercles on the thorax, triangular projections in the middle of posterior margin of tergites and lightened wide band along the medial line.

Key words: Ephemeroptera, mayfly, larva, morphology, Amur River, Russian Far East.

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Резюме. Приводится полное описание, фотографии и рисунки личинки среднего возраста *Teloganopsis gracilis*. Среди всех видов рода *Teloganopsis* личинка *T. gracilis* имеет наибольшее сходство с типовым видом *T. media* из Индо-Малайской области. Представители обоих видов имеют бугорки на тораксе, треугольные выступы посередине заднего края тергитов и осветленную широкую полосу вдоль средней линии.

INTRODUCTION

For a long time, the genus *Teloganopsis* Ulmer, 1939 was considered as monotypic. The type species *T. media* Ulmer, 1939 was described based on a single male imago and several larvae from Java and Sumatra. This species is distinguished from all the other Ephemerellidae by the structure of the hind wing (Ulmer, 1939). Very stout preapical denticle of the claw was proposed as a distinctive character for the larvae by Jacobus & McCafferty (2008). As a result, the species of various ecological types previously attributed to *Uracanthella* Belov, 1979, *Kangella* Sartori, 2004 (objective synonym of *Eburella* Kang et Yang, 1995), *Amurella* Kluge, 1997, as well as a part of the species of the genera *Ephemerella* Walsh, 1862, *Serratella* Edmunds, 1959, and *Torleya* Lestage, 1917 were included in the genus *Teloganopsis*. Later the genus *Teloganopsis* was considered as non-monophyletic taxon because it includes species with an uncertain phylogenetic position (Ubero-Pascal & Sartori, 2009). One of such species is *T. gracilis* (Tshernova, 1952) from the Russian Far East. The description of this species was made based on the three larvae and contains only four drawings: of maxilla, claw of the mid leg, gill of the third abdominal segment and anterior part

of the larva body (Tshernova, 1952), which allows to determine the species, but is insufficient for taxonomic studies. So, for example, 19 of the 40 larval parameters are unknown in the cladistic analysis by Ubero-Pascal & Sartori (2009) for *T. gracilis*. This is largely due to the extremely rare occurrence of this species. The latest mentions of the capture of *T. gracilis* date back to the middle of the XX century (Klyuchareva, 1963; Levanidova, 1968), and the collections contain only lectotype and two paralectotypes (Kluge, 1995). The finding of a middle age larva in a sample of drift river benthos in 2018 allows to prepare a full redescription and to add photos and drawing of the morphological features of this species for the correct determination of the phylogenetic position of *T. gracilis*.

MATERIAL AND METHODS

The larva of *Teloganopsis gracilis* was found in the Amur River basin by O. Kudrevskii in a sample of drift river benthos at a depth of 0.4 m. It was fixed in 4% formaldehyde solution and after identification was stored in 96% ethanol. The light microscopy methods were used to study the slides. Photographs were taken with an Olympus SZX16 stereomicroscope and an Olympus DP74 digital camera, and then stacked using Helicon Focus software. The final illustrations were post-processed for contrast and brightness using Adobe® Photoshop® software.

DESCRIPTION OF A MIDDLE AGE LARVA

Teloganopsis gracilis (Tshernova, 1952)

Figs 1–26

Ephemerella gracilis Tshernova, 1952: 275, figs. 79–82 (lectotype – mature larva, Russia: Khabarovsk krai; deposited in Zoological Institute, Russian Academy of Sciences, St. Petersburg; designated by Kluge, 1995).

Ephemerella (Amurella) gracilis: Kluge, 1997: 212.

Teloganopsis gracilis: Jacobus & McCafferty, 2008: 240, fig. 49; Ubero-Pascal & Sartori, 2009: 103.

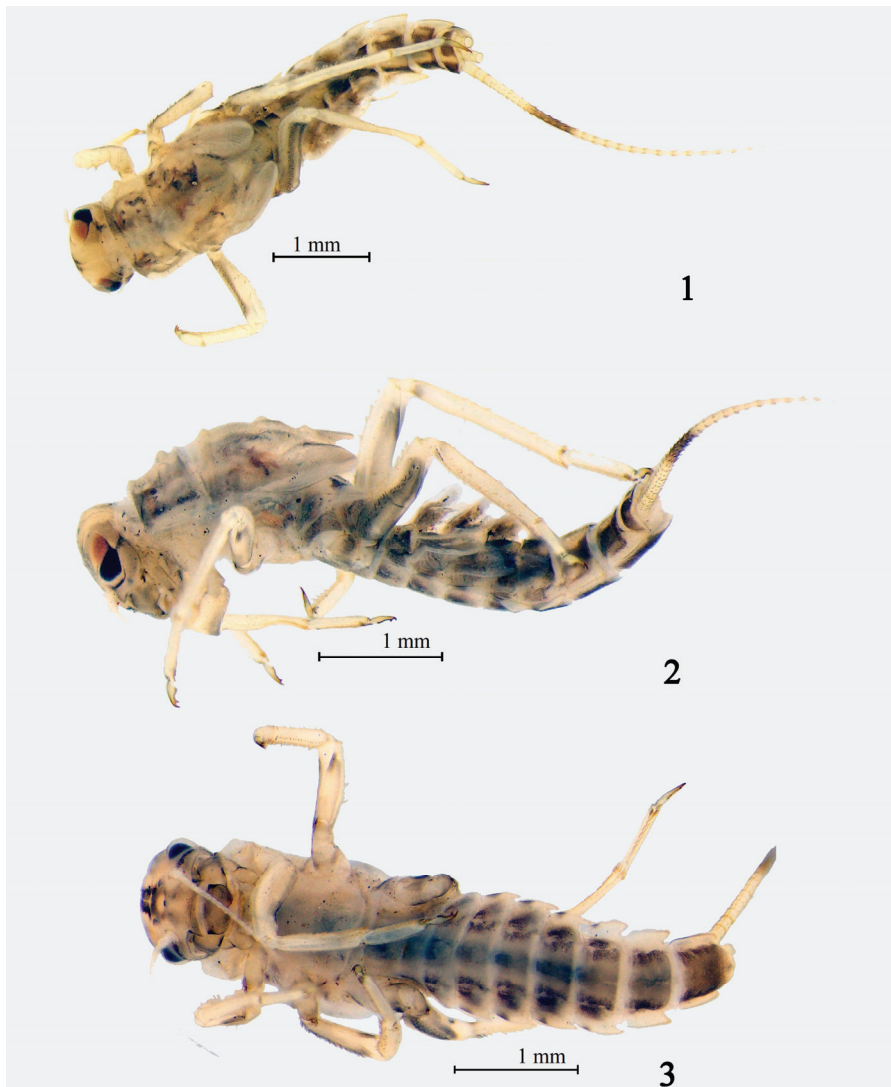
MATERIAL. Russia: Jewish Autonomous oblast, Amur River, Nizhneleninskoye Village, downstream from the bridge, 09.VII 2018, 1 middle-aged larva (O. Kudrevskii).

DESCRIPTION. Length (mm): body 5.0; cerci 4.2. Body slender, mostly beige with dark brown spots and wide beige stripe along medial line (Figs 1–3). All sclerotized structures abundantly covered with micro-thin transparent hairs.

Head without tubercles or projections, beige with two longitudinal brown strips (Fig. 4). Upper part of eyes ginger, lower one black. Antennae long. Labrum light brown, densely covered with setae; length to width ratio 1:2 (Fig. 5). Hypopharynx wide, rounded; superlinguae wide, oviform, with long thick setae along anterior and inner margins (Fig. 6). Mandible (Figs 7, 8) broad; left incisor (Fig. 9) with 4, right (Fig. 10), with 3 teeth. Maxilla wide, apex pointed with four teeth, densely covered by multitudinal long thin setae (Fig. 11). Inner margin of maxilla with a pair of dentisetae, with 2 rows inconsiderable in number thick and strong setae. Maxillary palpus missing. Labium wide, oval, densely pubescent on anterior margin (Fig. 12). Glossae rounded, wide, closely approximate. Labial palpus 3-segmented. 1st and 2nd segments of labial palpus wide, oval; 3rd segment conical; transition from 2nd to 3rd segment smooth.

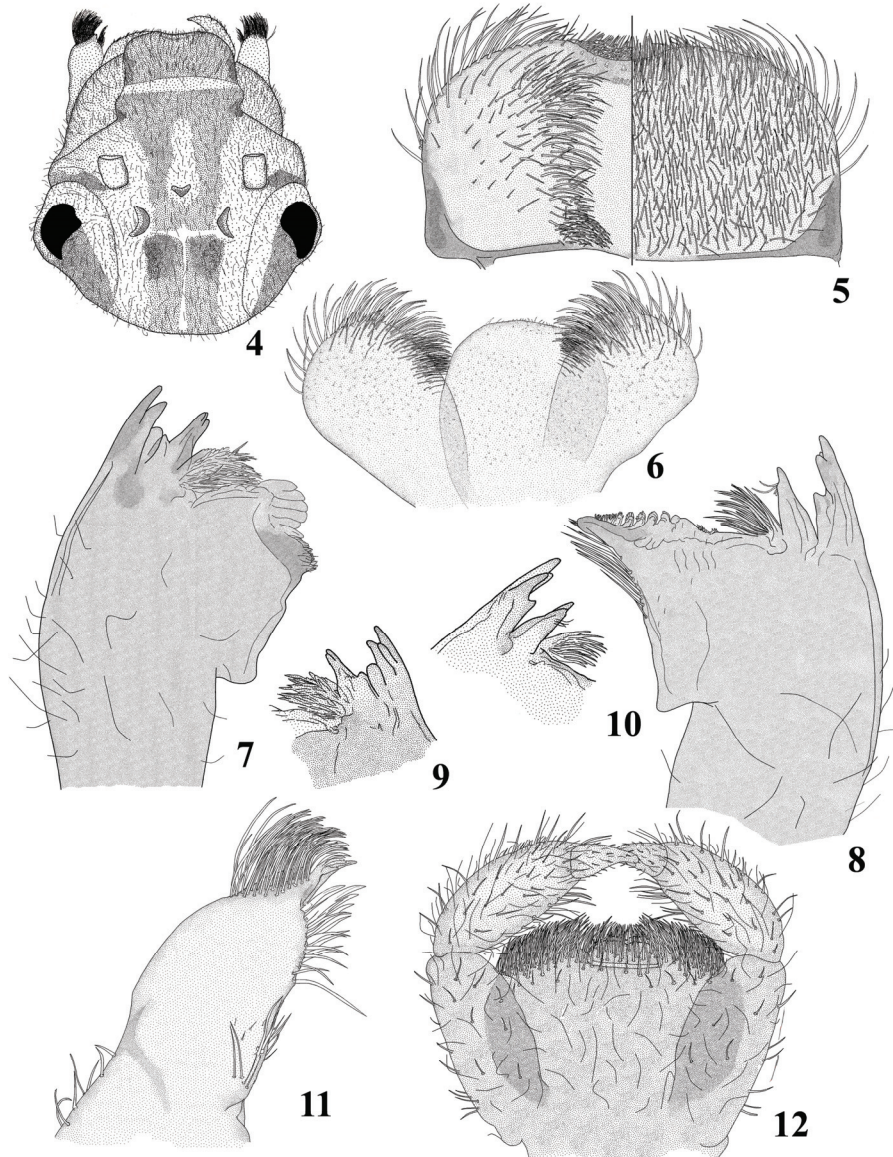
Thorax (Figs 13, 14) sculptured with lightened wide zone along medial line which surrounded with wide dark brown stripes with symmetrical large beige spots of various shape. Pronotum

wide with two high rounded medial tubercles. Anterior margin of pronotum is raised, bent dorsally. Mesothorax is separated by transverse sloping roller and has 3 high rounded tubercles: 2 symmetrical medial, 1 posterior. Rudiments of fore wings light beige.

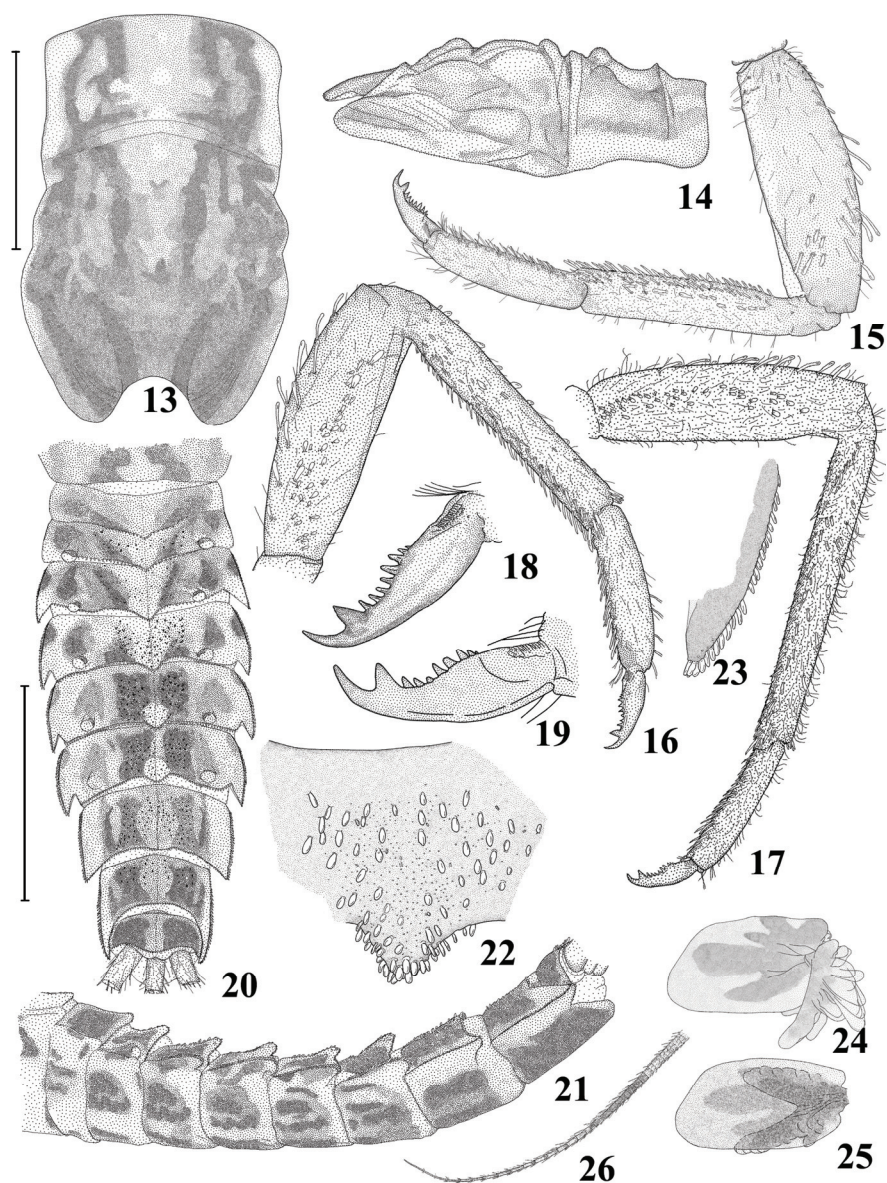


Figs 1–3. Larva of *Teloganopsis gracilis*, habitus. 1 – dorsal view; 2 – lateral view; 3 – ventral view.

Legs beige (Figs 15–17). Length (mm) of segments of legs (femur, tibia, tarsus): fore: 0.9; 0.8; 0.5; mid: 1.0; 0.9; 0.6; hind: 1.1; 1.5; 0.6. Fore and mid femora moderately dilated medially, hind one – narrower. All femora covered with rare long strong clavate setae. Dorsal surface of fore femur with some roundish setae near its articular with tibia. Dorsal surface of



Figs 4–12. Larva of *Teloganopsis gracilis*. 4 – head; 5 – labrum; 6 – hypopharynx and superlinguas; 7, 8 – mandibles, dorsal view (7 – left, 8 – right); 9, 10 – incisors, ventral view (9 – left, 10 – right); 11 – maxilla; 12 – labium.



Figs 13–26. Larva of *Teloganopsis gracilis*. 13, 14 – pro- and mesonotum (13 – dorsal view, 14 – lateral view); 15–17 legs (15 – fore, 16 – mid, 17 – hind); 18, 19 – claws (18 – fore leg, 19 – mid leg); 20, 21 – abdomen (20 – dorsal view, 21 – lateral view); 22 – unpaired tubercle of tergite with setae; 23 – setae of lateral angles and caudal margins of tergites; 24, 25 – tergaliae (24 – I pair, 25 – II pair); 26 – caudal filament.

mid and hind legs with medial zones of roundish different-sized setae along the whole surface of femurs. All tibiae and tarsi with 2 rows of numerous pointed setae on inner margin. All tibiae also have wide roundish setae that ranged chaotically over the whole surface. All claws with long thin apical tooth, one wide massive subapical tooth and row with 8 denticles (Figs 18, 19).

Abdomen. Tergites with wide beige stripe along whole medial line and dark brown symmetrical pattern on sides of it. This pattern particularly bright and extensive on tergites VI–X (Fig. 20). Caudal margins of tergites with unpaired tubercles along medial line. These tubercles particularly well-marked on tergites II–VII (Fig. 21) and covered by roundish setae (Fig. 22). Lateral margins of tergites bent distally; caudal corners arrow-headed, with elongated oval setae (Fig. 23). Sternites beige with rows of paired wide dark brown spots (Fig. 3). Tergaliae (Figs 24, 25) asymmetrical with roundish elongated inner-apical angle, trefoil-shaped spot and ventral lamella divided into lobes. Length (mm) of tergaliae I–V: 0.8; 0.8; 0.75; 0.6; 0.25. Caudal filaments in base and in apical 2/5 beige, in middle part (2/5 from base) brown (Fig. 26).

DIAGNOSIS. The claws of the larva *T. gracilis* have enlarged preapical denticle, this indicates to its affiliation with the genus *Teloganopsis*. The main difference of this species from other members of the genus including *T. lenoki* (Tshernova, 1952), *T. punctisetae* (Matsumura, 1931) and *T. orbicularis* Gorovaya, 2019 from the Russian Far East is unpaired tubercles, situated on the posterior margin of tergites. The similar but very small, hardly visible triangular projections in the middle of posterior margin of tergites II–V are present only in *T. media*.

Michel Sartori (2014) believes that *T. media* is unique among the genus *Teloganopsis* in the presence of tubercles on the thorax. However, the researched larva also has tubercles on the thorax. This is a new key feature that was not specified in the previous description of *T. gracilis*. A large sagittal light brown band on the thorax in *T. media* and lightened wide zone along the medial line in *T. gracilis* are noted as other external characteristics. There are differences in the structure of the mouth parts of these two species, but they are not so pronounced as the shape of the claws, shape and size of the denticles on the claws. The caudal angles of tergites in *T. media* are weakly expressed, while in *T. gracilis* they are strongly pointed.

DISTRIBUTION. Russia: Khabarovsk krai, Jewish Autonomous oblast (Amur River, middle and low reaches).

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REFERENCES

- Jacobus, L.M. & McCafferty, W.P. 2008. Revision of Ephemerellidae genera (Ephemeroptera). *Transactions of the American Entomological Society*, 134(1–2): 185–274. DOI: [http://dx.doi.org/10.3157/0002-8320\(2008\)134\[185:ROEGE\]2.0.CO;2](http://dx.doi.org/10.3157/0002-8320(2008)134[185:ROEGE]2.0.CO;2)

- Kluge, N.Ju. 1995. A catalogue of the type-specimens in the collection of the Zoological Institute, Russian Academy of Sciences. Insecta, Ephemeroptera. St. Petersburg, Zoological Institute RAS: 1–52. [In Russian]
- Kluge, N.Ju. 1997. Order Ephemeroptera. In: Tsalolikhin, S.J. (Ed.). *Key to freshwater invertebrates of Russia and adjacent lands*, St. Petersburg. 3: 176–220. [In Russian]
- Kljuchareva, O.A. 1963. On downstream and diurnal vertical migrations of benthic invertebrates in the Amur. *Zoologicheskii Zhurnal*, 42(11): 1601–1612. [In Russian]
- Levanidova, I.M. 1968. Benthos of Amur tributaries (an ecological-faunistic review). *Izvestia TINRO*, Magadan, 64: 181–289. [In Russian]
- Sartori, M. 2014. Complementary description of *Dudgeodes ulmeri* Sartori, 2008 and *Teloganopsis media* Ulmer, 1939 (Ephemeroptera: Teloganodidae, Ephemerellidae). *Entomologische Mitteilungen aus dem Zoologischen Museum Hamburg*, 17(192): 161–166. DOI: <http://dx.doi.org/10.13140/2.1.4400.7048>
- Tshernova, O.A. 1952. Mayflies (Ephemeroptera) of the Amur River Basin and Nearby Waters and Their Role in the Nutrition of Amur Fishes, Transactions of the Amur Ichthyological Expedition of 1945–1949. *Materialy k Poznaniyu Flory i Fauny SSSR, Izdavaemye Moskovskim Obshchestvom Ispytatelei Prirody*, 32(47), 229–360. [In Russian]
- Ubero-Pascal, N. & Sartori, M. 2009. Phylogeny of the genus *Teloganopsis* Ulmer, 1939 with a redescription of *Teloganopsis media* Ulmer, 1939 and the description of a new Oriental species (Ephemeroptera: Ephemerellidae). *Aquatic Insects*, 31 (Supplement 1): 101–124. DOI: <http://dx.doi.org/10.1080/01650420902819276>
- Ulmer, G. 1939. Eintagsfliegen (Ephemeropteren) von den Sunda-Inseln. *Archiv für Hydrobiologie*, Stuttgart. 16: 443–692. [In German]

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Address: Federal Scientific Center of the East Asia Terrestrial Biodiversity (former Institute of Biology and Soil Science), Far East Branch of the Russian Academy of Sciences, 690022, Vladivostok-22, Russia.

E-mail: storozhenko@biosoil.ru

web-site: <http://www.biosoil.ru/fee>